AGRICULTURAL NEWS LETTER

VOL. 2 - NO. 7 SEPTEMBER 1934

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It also gives reports of results obtained with products developed by these companies in the field, whether the tests are made by field men of the companies, by agricultural experiment stations or other bodies.

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SYNTHETIC ORGANIC INSECTICIDES

By: Dr. Paul L. Salzberg, research
chemist for the du Pont Company.

Ever since an ingenious gardener first tried green paint, prepared from copper and arsenic, for the control of potato beetles, the use of arsenic compounds has been one of our most efficient weapons in the constant warfare against insects affecting growing plants. For many years, lead and calcium arsenates have been the standard insecticides for the control of chewing insects. The field of inorganic chemicals has been carefully combed in order to develop the most satisfactory forms of arsenic compounds and to uncover other elements with insecticidal properties. Manganese arsenate and barium fluosilicate are examples of the newer insecticides that have thus been made available as supplements to standard arsenicals. In order to keep pace with the increasing difficulties of control which arise with the introduction of new insects, the increased spread of older pests, and the constant demand for insecticides having low toxicities to humans, chemists are now turning to the vast unexplored field of synthetic organic chemistry for new agents for the control of insects, taking their cue from the marked success that has been made in the field of synthetic drugs. It is recalled that inorganic materials such as bichloride of mercury provided us with one of our first successful disinfectants, but the development of harmless antiseptics now commonly used in mouth washes remained for the synthetic organic chemist.

The big advantage of synthetic organic compounds as a class is that they can be made to order for a specific purpose and consequently present numerous possibilities for meeting the demands of the ideal insecticide. This is because an organic insecticide does not necessarily depend on one element for its effectiveness but rather on the way in which a few non-toxic elements are combined. Using these elements as building blocks there is evidence that structures can be devised which will be extremely toxic to the lower forms of life and yet will be so readily destroyed by the more complex digestive systems of higher animals that traces of spray residue may be safely tolerated.

Alternatively, the insecticide may be so constructed that it penetrates rapidly into the surface of the insect and yet is so water-insoluble that it passes through the digestive tract of higher animals unchanged and without undue effect in small quantities. These are the reasons why entomologists are now looking to the large manufacturers of organic chemicals, well equipped with adequate research facilities, for radically new developments in the insecticide field.

OBSERVERS REPORT ON OUTLOOK FOR NEXT YEAR'S CEREAL CROP

Below are given some of the conclusions arrived at by the agricultural staff of the Bayer-Semesan Company after study of data assembled from the reports of field men and from other reliable sources.

There is presented also a discussion of smuts based on data obtained from United States Department of Agricultural publications.

According to Bayer-Semesan findings:

For a long time there has never been an American cereal crop that has had such importance in the eyes of the general public or been of such significance to the country's welfare as will be this fall's winter wheat crop. The great damage done by the drought means a curtailment of production, with the result that the surplus of wheat may be exhausted during the next twelve months, a condition that would indicate a substantial increase in prices of food products.

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Farmers during the past few years have failed to treat their seed wheat regularly and as a result the grain in some sections has become infested with stinking smut.

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The need for practicing seed treatment this year is by far greater than it has been for a number of years, not only from the standpoint of producing the maximum crop but also for the purpose of securing grain which will be marketable and command the highest prices.

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The following information on stinking smut has been taken from the United States Department of Agriculture, Extension Publication, entitled, "Increase Wheat Profits by Preventing Stinking Smut."

Many people do not know what stinking smut looks like either in the field or in the threshed grain. This is not surprising because it is very difficult even for experts to detect it in the field in certain stages of development and in some varieties. Infected plants cannot be distinguished from healthy ones until the heads appear. At blooming time, however, slight differences between the healthy and diseased heads become evident. On the healthy heads yellow pollen sacs or anthers emerge, but on the totally infected heads these are entirely absent. Also, there is a slightly more irregular appearance and wider diameter in the case of the diseased head.

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In a stinking smut head it will be observed the kernels are transformed into smut balls. A close examination of those smut balls shows that in general they are shorter than healthy kernels and differ both in shape and color. They tend to be more irregular and more nearly spherical in shape and are brown in color. Furthermore, they have a decidedly bad odor. In samples of wheat they can be distinguished easily from the healthy kernels by close examination. They are easily crushed between the thumb and finger. When this is done they are found to be made up of an oily, brownish-black powder enclosed in a thin, paperlike shell.

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The fine black powder is seen to be composed of tiny, spherical bodies. These are the seedlike bodies, germs or spores of the parasite, the smut fungus, which causes this disease. Each spore is capable of infecting the wheat plant and causing every head of that plant to produce smut balls instead of sound wheat. There are about as many of these spores in a single smut ball as there are kernels of wheat in five or six bushels of grain. It is these spores that come out of the threshing machine in black clouds of dust when smutty wheat is being threshed. It is these spores that, mixing with other dusts and ignited by a spark of static electricity, sometimes cause explosions of threshing machines. It is these spores that, smeared over the outside of wheat kernels, cause the grain to have a dark and dirty appearance. These minute, oily smut spores easily stick on the outer surface of the wheat, especially in the brush and in the groove of the kernels.

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There are two common smuts of wheat. First, the stinking smut, or bunt, and second, the loose smut. This loose smut is often mistaken for stinking smut. It first appears at about the time when the heads are emerging from the boot. It is easily distinguished from the stinking smut by the loose, fluffy, black mass of spores into which the entire head, including the glumes, is transformed. Loose smut heads have no covering and the smut is soon blown or washed away by wind and water, leaving a bare stalk which becomes quite inconspicuous as the wheat ripens. This disease cannot be controlled in the same way as stinking smut, that is, by seed treatment with chemicals. It is prevented by treating the seed with hot water.

EXPERIMENTAL FIELD WORK WITH "LORO" IN THE GULF COAST SECTION

By W. F. Larrison, field representative of The Grasselli Chemical Company.

Note: In view of the great attention being given at the present time to the effort to find new and better insecticides, the report given below of field trials with Loro, a new contact insecticide recently announced, may be of interest.

"Loro," the new contact spray, manufactured by The Grasselli Chemical Company, was first tried out at the company experimental station at Wooster, Ohio. It was very promising - so much so, in fact, that open field trials were decided on. The writer was sent into south Florida the latter part of January of this year (1934), the Florida territory being selected as having the greatest variety of vegetable crops below the probability of frost.

The Florida work was nearly all conducted at the Alapatta Gardens, midway between Miami and Homestead, near the shore line. The Alapatta Gardens is marl land from three to five feet above sea level, lying on a bed of coral rock with a soil from one to three feet deep. Marl land should not be confused with the muck land of the Everglades. The marl is high in lime and low in organics. So high is the lime content that much of the soil is excessively sweet and must be corrected with acid fertilizers.

Tests for Foliage Injury

In contrast the muck lands are very low in lime and high in organics. The first trials with Loro was to test out for foliage injury; the crop selected being New Zealand spinach, the least resistant crop to a burn on the Florida east coast. Loro was used as a liquid at various strengths up to one ounce to one-half gallon of water and in no instance was any burn detected. As a dust (two and one-half and five percent active material) the plants were entirely covered, with no injury. Six beet plants were selected and Loro sprinkled on with no dilution. The leaves were badly burned but the ribs were uninjured and a new growth was made in a few days.

About seventy blocks of vegetables were sprayed or dusted in this work, covering all crops grown in south Florida. Perfect control was obtained on all sucking insects on broccoli and cabbage. The kill of loopers and worms was very satisfactory.

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It gave real control on the onion thrip, also.

A trial was made on watermelons for striped beetle and lice, and a complete kill made. These melons were in poor condition, but no injury to foliage occurred. A check was made for two weeks but no beetle or lice were ever found. No rain, however, occurred in the meantime. The five percent dust was used here.

Tested for Peppers

A block of peppers was dusted. These peppers had borne a marketable crop and at the time of dusting were full of second sets. The dust was applied in early morning, while wet with dew. A few peppers were of marketable size - mostly, however, all small ones. Where the peppers were fully grown the dust ruined them, causing them to become soft, but in the small peppers no injury was done.

On turnips, spinach, and mustard, all lice were killed but poor results were obtained on loopers and worms. In comparison with pyrethrum mixtures for white fly on bush lima beans, the results were far ahead with Loro, as a dust. Used as a liquid on this crop, it gave poor control. A pyrethrum compound (liquid) applied on parallel rows gave no control whatever. On eggplant, as a liquid, it gave a perfect control on beetle, spraying being done in ten-day intervals. One block of small turnips had been abandoned by the grower. One-half of the block was dusted with Loro and a fair crop was made. The undusted portion was entirely destroyed with lice.

Bush lima beans infested with red spider were dusted when wet with dew. The five percent dust gave a perfect control; the two and one-half percent very poor.

On collards at Owega, Georgia, Loro was combined with Dutox liquid, two pounds of Dutox to 50 gallons. One ounce Loro to six gallons of this mixture was used. The infestation was worms, loopers and lice. A fine control resulted. Striped cucumber beetle on squash was also eliminated at Owega. Trials were made at Charleston, Missouri, on the young Colorado potato beetle, applied as a liquid, and a 97% kill obtained.

INCREASE IN PLANTING OF BARLEY CROP EMPHASIZES NEED FOR SEED TREATMENT

Reports from various localities, particularly Pennsylvania, indicate that this year there will be very substantial increases in acreage devoted to the planting of barley, which is coming into greater use as feed for cattle, while demand for it for other purposes has shown decided upturn.

Timely information on treatment for seed barley is given in the abstracts below which have been taken from the United States Department of Agriculture, Farmers' Bulletin 1732, entitled, "Growing Barley for Malt and Feed."

"Three of the most important diseases of barley for which chemical or cultural treatments are known are scab, stripe, and covered smut.

"Scab is largely confined to the Corn Belt. Scab affects the quality of the grain and reduces the yield. Barley with more than a small percentage of scab cannot be used for malting. It is also unsuitable to feed pigs, causing vomiting in extreme cases. If the grain is less heavily infested, the pigs fail to make normal gains. Scabby barley can be fed to all classes of cattle and sheep.

"Treatments for scab are largely preventive. Since the disease is carried over on cornstalks and grain stubble, such material should be carefully plowed under before seeding. The disk obviously is no substitute for the plow on stubble land. Fields that were not planted to either corn or small grain the previous year are likely to be free from scab. In scab areas, the seed should be run through the fanning mill before being sown, to remove as many infected kernels as possible.

"The grain should be treated with a mercury-dust compound. The only satisfactory method of application is with dusting machines, which can be purchased on the market. The machine should be rotated until every kernel is covered with a film of dust. All mercury-dust compounds are poisonous. The operators of dusting machines should plug the nostrils with cotton and cover their mouths with moist bandages to avoid breathing the dust.

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"Blighted barley is a market problem. Darkened underdeveloped kernels are caused by a wide variety of organisms in addition to that of scab. The effect of many of these are less objectionable than scab, especially for hog feeding. The buyers are often unable to determine the cause of the damage or to distinguish scabby kernels from kernels affected by other organisms. Seed treatments and clean culture reduce the amount of infection of some of these organisms.

"Covered smut is the most widely distributed of the important diseases of barley. The total loss due to it is considerable. The percentage of infection varies enormously with season and region. Where covered smut is common, clean seed should be used where possible. If clean seed is not at hand, the farmer should resort to dust treatment. One of the mercury dusts is a logical choice, not only because of its usefulness in treating smut but also because of its effect on scab and stripe, where these are present. All three diseases can be controlled by a single treatment, insofar as seed treatment is effective. The mercury dusts are also effective in treating one form of loose smut. The other forms can be controlled by the hot-water treatment. Because of serious seed injury that may result, the hot-water treatment is not recommended for use by farmers. County agricultural agents can give suggestions as to sources of chemicals and methods of treatment."

UTILIZATION OF AGRICULTURAL PRODUCTS FOR INDUSTRIAL CHEMICAL MANUFACTURES

Ever since the beginning of manufacturing in shops and factories, the farm and the plantation have been sources of raw materials. Wool, cotton and animal hides for making leather were, and still are, important stuffs in industry.

Until comparatively recent times, the making of things from raw materials produced in fields consisted almost wholly of merely altering the shape. To illustrate, wool and cotton were spun into yarn and woven into textiles, but remained wool and cotton.

With the development of industrial chemical industries, however, scientists have found in farm products the raw stuffs for the production of a wide range of substances, not found in nature, to serve the needs and desires of a progessive civilization.

The marvel of chemical products manufacturing is that various stuffs can be so changed by processing that not only are the original forms changed, but also the physical properties and to such an extent that the identities of the raw materials are lost completely.

Cotton, in volume equivalent to many thousands of bales a year, is required in the making of rayon and other fibers; for pyroxylin products such as the finish for automobiles; substances for the coating of lacquered fabrics used for book binding, upholstery material and other products, and for impregnating cloth in the making of washable window shades and soil-proof book covers; for photographic and motion picture film; toilet articles, fountain-pen "barrels," hair and dress ornaments, buttons and scores of other things; smokeless sporting powders, and waterproof cement.

Corn, once considered as useful only for human food, and animal and poultry feeds, is now used by the chemist for various industrial purposes. Incidentally, the use of corn has been greatly extended in the field of foodstuffs as a result of chemical research.

In industry, corn derivatives enter into the manufacturing of rayon, automobile lacquer, paints, colors, soaps, glycerine, adhesives and other products. By the fermentation of cornstarch, are produced butanol, alcohol, acetone, carbon-dioxide and hydrogen, all of which are useful in chemical manufactures. For one thing, the carbon-dioxide, a by-product of fermentation, is used in making "dry ice", while another by-product, hydrogen, is used in chemical synthesis.

What the industrial chemist is doing with cotton and corn is typical of the growing uses of other products of the soil in chemical manufacturing.

However, as an eminent scientist puts it: "The chemistry of the utilization of agricultural products and by-products or wastes is still in its infancy."

STRIPED CUCUMBER BEETLE CONTROL REPORTED FROM SOUTHERN SECTION

Following observations and demonstrations in Missouri, a field man* reports on the effects of the use of barium fluosilicate as follows:

"In the spring of 1934, demonstrations of the control of the striped cucumber beetle on watermelons and cantaloupes with barium fluosilicate were made in the vicinity of Kennett, Missouri. In cooperation with C. R. Talbert, county farm agent, it was proved that this insecticide actually killed the beetles.

"Mr. Talbert had given barium fluosilicate plot tests for several years, but growers were skeptical and it required trials on a commercial scale in their fields to convince them. Fields of representative growers were selected and rows of watermelon vines were dusted after all the dew was off the plants. In one instance, the dusting was done just before noon, and at 4:00 P. M., the grower reported finding large numbers of dead beetles. A check on the results, made twenty-four hours after the dusting, revealed an abundance of dead beetles but no live ones."

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*Representative of the Grasselli Chemical Co., Cleveland, Ohio.

TREE PLANTING WITH DYNAMITE

Recently, there has been a renewal of interest in a simple and effective method of accelerating the growth of trees, especially fruit and nut, which had its inception some years ago when a California orchardist, seeking a means to save labor, used dynamite to blast holes for the planting of trees and then discovered that trees planted in that manner showed a decided increase in growth over those planted in holes dug in the earth. The procedure now followed was developed by explosives experts with the co-operation of orchardists.

Thousands of fruit, nut and shade trees have been planted in blasted holes by leading orchardists and nurserymen. Those who have followed the practice have found that the explosion of a charge of dynamite in compact subsoil shatters the soil so that the fibrous roots can extend to wider and deeper areas and draw upon a larger store of plant food and moisture than would be available in the restricted feeding ground provided when a tree is planted in a spade dug hole.

While the blasting may be done on light soils, it is not advisable to do it on open, well-drained sandy and gravel soils. Blasting should be done when soils, especially clay soils, are dry. Where the soil is sufficiently dry, blasting is effective in tight soils which otherwise might be more or less unfavorable to the growth of young trees.

The blasting can be done at planting time, but it is recommended that it be done some time in advance. This has particular application in northern sections of the country where trees are planted in the spring. In such localities, it is the practice of some orchardists to blast the soil in August or early September, dig out the holes and leave them exposed to sun and air until the following spring.

Generally speaking, the proper time to blast soil preparatory to planting trees is in the later part of August or early in September. The subsoil is then likely to be at its driest and the explosions of dynamite will have the widest and greatest shattering effect.

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The work is simple and easy. A bore hole is punched into the ground and loaded with a half or a whole cartridge of dynamite. A so-called agricultural dynamite, such as Agritol, is an excellent explosive to use, since a shattering effect is obtained without blowing out the soil. The charges are primed with blasting caps and fuse. The fuse should be long enough to permit the blaster to take a safe distance. The holes should be well tamped with earth.

All the loosened subsoil should be removed from the cavity made by the blast and after the tree is planted, the hole should be filled with top soil, which may be enriched by the addition of manure, commercial fertilizers or ground limestone, as conditions require.

GRAIN GROWERS OF NORTHWEST LEARN MUCH ABOUT SMUT DAMAGE FROM MOVIE

An entertaining and educational talking motion picture, entitled, "Grain Thieves," recently completed for the Bayer-Semesan Company, Wilmington, Delaware, is being distributed for showing by theatres in the grain growing sections of the Northwest. Descriptive of the film, the following appeared in the amusement column of a newspaper in a city where the picture was given a premier showing:

"Two hundred million bushels and more of grain is the annual toll levied by grain thieves upon America's cereal crops -- a terrific loss in profits to the grain growers of this country. These thieves play no favors, but levy their toll on every grain grower except those that know how to prevent their pilfering.

"They travel under the alias of stinking smut of wheat, smuts of oat, and covered smut and stripe of barley. How these thieves can be beaten is shown in the interesting, entertaining movie, "Grain Thieves." This film reveals how these thieves hide on or in the seed, how they operate after the seed has been planted, what effect they have on the stand, yields and market value of the crop. In it you see the actual growth of grain and the effect of barley stripe, one of the grain thieves, on the plant. The life story of smut and the close-ups of the principal seed-borne diseases of grains, also the various steps in marketing a grain crop including inspection, dockage, and dumping a carload of grain at the terminal elevator are interesting features of this film."
